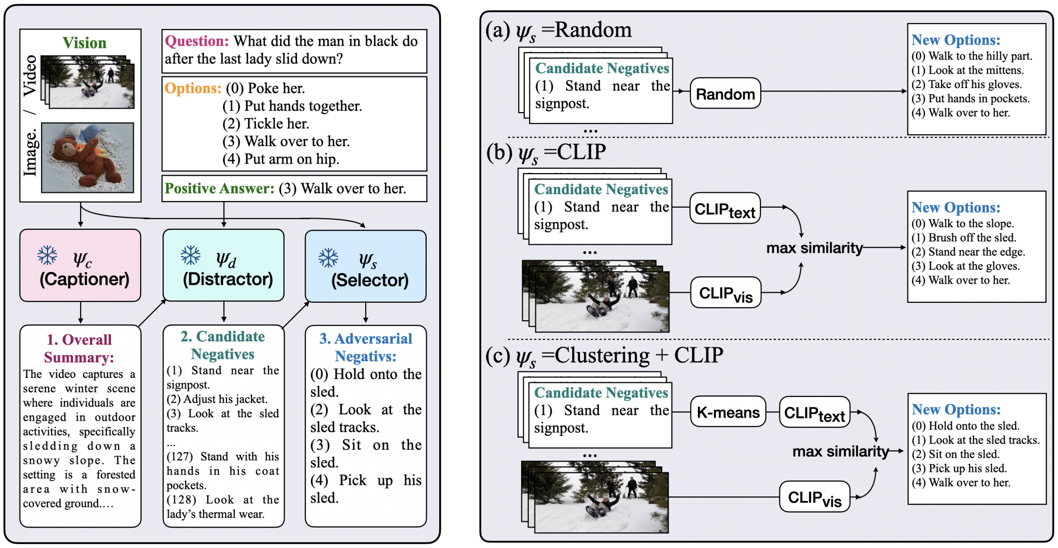
A GroundAttack and selector ψ_s types

To facilitate better understanding and implementation, we present a detailed pipeline of GroundAttack and various strategies for the selector ψ_s in Figure 6. The pipeline below displays the illustrative frameworks introduced in Section 2.


Vision
Image. / Video
Question: What did the man in black do after the last lady slid down?
Options: (0) Poke her.
(1) Put hands together.
(2) Tickle her.
(3) Walk over to her.
(4) Put arm on hip.
Positive Answer: (3) Walk over to her.
ψ_c (Captioner)
ψ_d (Distractor)
ψ_s (Selector)
1. Overall Summary: The video captures a serene winter scene where individuals are engaged in outdoor activities, specifically sledding down a snowy slope. The setting is a forested area with snow-covered ground.…
2. Candidate Negatives
(1) Stand near the signpost.
(2) Adjust his jacket.
(3) Look at the sled tracks.
...
(127) Stand with his hands in his coat pockets.
(128) Look at the lady's thermal wear.
3. Adversarial Negativs:
(0) Hold onto the sled.
(2) Look at the sled tracks.
(3) Sit on the sled.
(4) Pick up his sled.
(a) ψ_s =Random
Candidate Negatives
(1) Stand near the signpost.
...
Random
New Options:
(0) Walk to the hilly part.
(1) Look at the mittens.
(2) Take off his gloves.
(3) Put hands in pockets.
(4) Walk over to her.
(b) ψ_s =CLIP
Candidate Negatives
(1) Stand near the signpost.
...
$\text{CLIP}_{\text{text}}$
CLIP_{vis}
max similarity
New Options:
(0) Walk to the slope.
(1) Brush off the sled.
(2) Stand near the edge.
(3) Look at the gloves.
(4) Walk over to her.
(c) ψ_s =Clustering + CLIP
Candidate Negatives
(1) Stand near the signpost.
...
K-means
$\text{CLIP}_{\text{text}}$
CLIP_{vis}
max similarity
New Options:
(0) Hold onto the sled.
(1) Look at the sled tracks.
(2) Sit on the sled.
(3) Pick up his sled.
(4) Walk over to her.

(a) GroundAttack

(b) Selector ψ_s

Figure 6: **GroundAttack** generates adversarial negative options that are more confusing, diverse, and visually groundable than original negatives. It mitigates Easy-Options Bias in VQA benchmarks through three components: (1) the Captioner (ψ_c), which converts visual content into detailed descriptions; (2) the Distractor (ψ_d), which produces plausible, groundable negative candidates; and (3) the Selector (ψ_s), which identifies the most adversarial negatives.

B Prompts for captioner ψ_c and distractor ψ_d

We define the roles of the captioner ψ_c and distractor generator ψ_d as follows:

- We utilize GLM-4.1V-9B as the captioner ψ_c to convert video or image-based visual inputs $\boldsymbol{V}$ into descriptive textual captions $\boldsymbol{T}$.
- For the distractor ψ_d, we employ Gemma-3n-E48 to generate candidate negative answers $\boldsymbol{O}_c$ conditioned on the question $\boldsymbol{Q}$, the correct answer $\boldsymbol{A}$, and the visual captions $\boldsymbol{T}$.
- For image inputs, captions are generated based on salient objects, attributes, spatial relationships, and the overall scene.
- For video inputs, captions focus on objects, locations, atmosphere, and dynamic actions.

B.1 Prompts for Images

We present the three prompts used in GLM-4.1V-9B for **image captions** as follows:

Prompt for generating fact from image

```
You are an assistant that generates descriptive facts about an image.
### Instructions:
1. Input: You will be given an image.
2. Task: Based on the image, produce a concise descriptive caption in one or two sentences.
3. Output format: Return the result strictly as a Python JSON string, using the following structure:
{
"fact": "string"
}

4. Constraints:
- Only output the JSON string, no explanations or additional text.
- All keys and string values must be enclosed in double quotes (‘"‘).
- Ensure the JSON is valid Python syntax.
```

Prompt for detect object bounding boxes from image

```
You are an assistant that generates detailed object information from an image.

### Instructions:
1. Input: You will be given an image.
2. Task: Detect at least 6 objects. For each object, specify:
- color
- size
- texture
- bounding box coordinates

The bounding box must be represented as normalized percentages of the image dimensions, in the format [x_min, y_min, x_max, y_max], where each value is between 0.0 and 1.0.

3. Output format: Return the result strictly as a Python JSON string, using the following structure:

{ "objects": ["string", "string", ...],
"object_details": {
"object1": { "color": "string", "size": "string", "texture": "string", "bounding_box": [x_min, y_min, x_max, y_max] },
"object2": { "color": "string", "size": "string", "texture": "string", "bounding_box": [x_min, y_min, x_max, y_max] } } }
4. Constraints:
- Bounding box values must be floats between 0.0 and 1.0, representing percentages of the image dimensions.
- Only output the JSON string, no explanations or additional text.
- All keys and string values must be enclosed in double quotes (‘"‘).
- Ensure the JSON is valid Python syntax.
```

Prompt for extract action, spatial relations from image

```
You are an assistant that extracts actions, scene context, and spatial relations from an image.

### Instructions:
1. Input: You will be given an image.
2. Task: Based on the image, identify:
- actions: Any motions or interactions happening.
- human_actions: Specific actions performed by humans.
- spatial_relations: Relative positions between key objects (e.g., "cup on table").
- scene: A single sentence summarizing the overall setting (e.g., "A cozy café interior at dusk").

3. Output format: Return the result strictly as a Python JSON string, using the following structure:

{ "actions": ["string", "string", ...], "spatial_relations": ["string", "string", ...], "scene": "string" }
4. Constraints:
- Only output the JSON string, no explanations or additional text.
- All keys and string values must be enclosed in double quotes (‘"‘).
- Ensure the JSON is valid Python syntax.
```

Prompt for generating distractors for Image VQA

We present the prompt used in Gemma-3n-E48 for generating 128 **candidate negative options** as follows.

```
You are an expert at generating challenging negative distractors for image-based question answering. Given an image description, a question, and its correct answer, generate 128 clearly and definitively incorrect answer options.

### Guidelines:
1. **Grounded in the image**: Each distractor must reference actual events, objects, or details mentioned in the image description.
2. **Specifically Incorrect**: None of the distractors should correctly answer the given question.
3. **Deceptively Similar**: Distractors should resemble the correct answer in format, length, or type, making them plausible at first glance.
4. **No Hallucinations**: Do not introduce objects, actions, or details not present in the image description.

### Example:
[Image Description]: A white dog is lying on a pet bed.

[Question]: What does the white dog do after going to the cushion?
[Correct Answer]: Smells the black dog

[Negative Options] (JSON format):
{
"new_negatives": {
"0": "Lies down on the pet bed.",
"1": "Walks toward the black dog.",
"2": "Explores the pet bed.",
"3": "Watches the black dog."
...
} } ### Output:
- Provide exactly 128 numbered negative options.
- The output must be valid JSON following the structure above.
- Ensure the output is UTF-8 encoded.
```

B.2 Prompts for Videos

We present the three prompts used in GLM-4.1V-9B for **video captions** as follows:

Prompt for generating fact from video

```
You are an assistant that generates descriptive facts about a video.

### Instructions:
1. **Input**: You will be given a few video frames.
2. **Task**: Based on these frames, produce a concise descriptive caption in few sentences.
3. **Output Format**: Return the result strictly as a Python JSON string, using the following structure:

{
"fact": "string"
}

4. **Constraints**:
- Only output the JSON string; no explanations or additional text.
- All keys and string values must be enclosed in double quotes (").
- Ensure the JSON is valid Python syntax.
```

Prompt for detect objects from video

```
You are an assistant that generates detailed object information from a video.

### Instructions:
1. **Input**: You will be given a few video frames.
2. **Task**: Detect at least 6 objects. For each object, specify:
- color
- size
- texture
- spatial relations between objects

3. **Output Format**: Return the result strictly as a Python JSON string, using the following structure:

{ "objects": ["string", "string", ...],
"object_details":
"object1": "color": "string", "size": "string", "texture": "string" ,
"object2": "color": "string", "size": "string", "texture": "string" ,
"spatial_relations": [
"object1 on top of object2",
"object3 next to object4", ... ]
4. **Constraints**:
- Only output the JSON string; no explanations or additional text.
- All keys and string values must be enclosed in double quotes (").
- Ensure the JSON is valid Python syntax.
```

Prompt for extracting actions from video

```
You are an assistant that extracts actions, scene context, and spatial relations from a video.

### Instructions:
1. **Input**: You will be given a few video frames.
2. **Task**: Based on these frames, identify:
- **actions**: Any motions or interactions happening.
- **human_actions**: Specific actions performed by humans.
- **spatial_relations**: Relative positions between key objects (e.g., "cup on table").
- **scene**: A single sentence summarizing the overall setting (e.g., "A cozy café interior at dusk").

3. **Output Format**: Return the result strictly as a Python JSON string, using the following structure:

{
"actions": ["string", "string", ...],
"spatial_relations": ["string", "string", ...],
"scene": "string"
}

4. **Constraints**:
- Only output the JSON string; no explanations or additional text.
- All keys and string values must be enclosed in double quotes (").
- Ensure the JSON is valid Python syntax.
```

Prompt for generating distractors for Video VQA We present the prompt used in Gemma-3n-E48 for generating 128 **candidate negative options** as follows.

```
You are an expert at generating challenging negative distractors for video-based question answering. Given a video description, a question, and its correct answer, generate 128 clearly and definitively incorrect answer options.

### Guidelines:
1. **Grounded in the Video**: Each distractor must reference actual events, objects, or details mentioned in the video description.
2. **Specifically Incorrect**: None of the distractors should correctly answer the given question.
3. **Deceptively Similar**: Distractors should resemble the correct answer in format, length, or type, making them plausible at first glance.
4. **No Hallucinations**: Do not introduce objects, actions, or details not present in the video description.

### Example:
[Video Description]: A white dog is lying on a pet bed.

[Question]: What does the white dog do after going to the cushion?
[Correct Answer]: Smells the black dog

[Negative Options] (JSON format):
{
"new_negatives": {
"0": "Lies down on the pet bed.",
"1": "Walks toward the black dog.",
"2": "Explores the pet bed.",
"3": "Watches the black dog."
...
} } ### Output:
- Provide exactly 128 numbered negative options.
- The output must be valid JSON following the structure above.
- Ensure the output is UTF-8 encoded.
```